DECISION-MAKING FRAMEWORK

1. BACKGROUND

Since the passage of the Uranium Mill Tailings Radiation Control Act (UMTRCA) of 1978, decommissioning and waste disposal programs have significantly changed. States and Compacts had at one time planned on developing a dozen new low-level radioactive waste disposal sites, but have been unable to develop any new regional disposal capacity under the Low-Level Waste Policy Act of 1980. As a result, future disposal options are uncertain. Costs for conventional low-level radioactive waste (LLW) disposal have increased by more than a factor of 10 as disposal options have become more limited. At the same time, there are now large programs for remediating contaminated sites, including the Nuclear Regulatory Commission's (NRC) Site Decommissioning Management Program (SDMP).[1] These programs have of millions of cubic meters of radioactive waste that required isolation and/or disposal. For comparison, much of the wastes from these sites, that are contaminated by uranium and thorium, would be classified as very low-level waste if the wastes were under the purview of the European Community.

With the small number low-level radioactive waste (LLW) disposal facilities and the high costs of disposal, generators have pursued other options. Several Resource Conservation and Recovery Act (RCRA) hazardous waste facilities are authorized by their State regulatory agencies to accept very low-activity nuclear fuel cycle waste for disposal and are an option for certain types of low-activity waste at NRC-licensed sites. NRC has granted approval for disposal at several of these sites for "unimportant quantities" of source material. The U.S. Army Corps of Engineers (COE), in implementing the Formerly Utilized Sites Remedial Action Program, has also explored new and less costly options for disposal of low-activity waste, and continues to use RCRA Subtitle C facilities. In addition, COE has sent materials to uranium mills as an "alternate feed material" for natural ores. The materials from a contaminated site, which normally would be considered waste, are processed in the uranium mill, the residual uranium extracted, and the tailings disposed of in the existing tailings impoundment. In some cases, waste from contaminated sites have also been directly disposed of in mill tailings impoundments. With the decline in the uranium mining and milling business over the last two decades, companies with uranium mills, and the National Mining Association representing these companies, have pursued this business and have asked NRC to reconsider its policies that govern direct disposal and alternate feed material and allow for the expanded use of tailings impoundments for disposal of other types of materials.

NRC has been aware of these changes in the external environment and the need for revising its regulatory program. The rulemaking on transfer of "unimportant quantities" of source material will address transfers for disposal of these materials and clarify NRC's expectations for such disposals. NRC's Jurisdictional Working Group,[2] consisting of representatives from Federal agencies with responsibilities for low-activity materials and the Organization of Agreement States

[1] In a staff requirements memorandum dated August 22, 1989, the Commission directed the staff to develop a comprehensive strategy for NRC activities to deal with contaminated sites, to achieve closure on decommissioning issues in a timely manner.

[2] The Jurisdictional Working Group was formed in response to the Commission's SRM on SECY-99-259, dated March 9, 2000.

and Conference of Radiological Control Program Directors, is examining methods for more rationally addressing risk management of low-end materials, particularly technologically enhanced naturally occurring radioactive materials (TENORM) and low-activity source materials. In November 2000, at the direction of the Commission, the staff issued NRC Regulatory Issue Summary 2000-23, "Recent Changes to Uranium Recovery Policy," that provides more flexibility in allowing non-11e.(2) byproduct material to be disposed of in uranium mill tailings impoundments. All these changes are informed by the increased use of risk insights. Waste disposal regulations are often based on the pedigree of the waste (uranium mill; spent fuel; and non-fuel cycle activities, such as oil drilling, that produce TENORM, etc.) rather than the hazard that wastes pose. Consideration of risks and alternative means for managing risk have opened up other options, such as RCRA hazardous waste facilities for low-activity source material.

In 1997, NRC issued its License Termination Rule (LTR) in 10 CFR Part 20, Subpart E. The rule allows for restricted release of sites under certain conditions. The rule defines conditions for leaving greater amounts of residual radioactivity on site than for unrestricted release. In practice, however, no NRC licensee has yet been able to find an independent third party/custodian who would enforce the institutional control provisions of the rule. In effect, the only options available to many licensees with sites contaminated with uranium or thorium is to clean up to unrestricted release levels or to keep their site under a specific license. The U.S. Department of Energy (DOE) has thus far not been willing to exercise its authority, under section 151(b) of the Nuclear Waste Policy Act (NWPA) of 1982, to become the long-term custodian for sites desiring restricted release. DOE does not have similar discretion if the residual radioactivity is 11e.(2) byproduct material.

The staff believes that further improvements in risk-informing decisions are possible for managing and disposing of large volumes of wastes. These improvements also have the potential to increase competition for waste disposal, decrease the burden on licensees, and better harmonize the regulation and management of radioactive materials in the U.S. In this section, the staff discusses considerations for guiding present and future decision-making on the disposition of wastes from the decommissioning of sites contaminated with large volumes of uranium and/or thorium, when those materials can be viewed as meeting more than one regulatory definition of licensed material, especially 11e.(2) byproduct material. NRC in the past may have narrowly defined the classification of materials and unnecessarily constrained the remediation and disposal options. NRC developed its Strategic Plan (NUREG-1614) in late 2000 and began to use it in the Agency's planning and budgeting process, including evaluation of policy options, using the four performance goals from the Strategic Plan. Thus, previous staff positions are not necessarily based on the more recent and broader consideration of the four Strategic Plan performance goals.

- Maintain safety, protection of the environment, and the common defense and security;
- Increase public confidence;
- Make NRC activities and decisions more effective, efficient, and realistic; and
- Reduce unnecessary regulatory burden on stakeholders.

Above all, this framework assures that available risk information and other important factors are factored into the proper disposition of waste materials, within the constraints of the legislative and regulatory requirements for the licensed material.

In this Attachment, the staff discusses specific considerations that go into achieving the above four performance goals for these types of sites. The objective of this framework is to identify effective and efficient solutions, as long as they achieve adequate protection of the public health and safety and meet the laws and regulations that apply to remediation.

This framework applies to sites having large volumes of materials contaminated with relatively low concentrations of uranium and/or thorium. These materials need to be either removed from the sites for processing or disposal and/or stabilized onsite so that they do not present a significant hazard to the public or the environment. The volumes of materials at these sites are large and may be several hundred thousand cubic meters or more. Thus, substantial funds may be needed to dispose of this material offsite, since disposal costs can range from $165 - 700 per cubic meter ($5-20 per cubic foot) for these types of waste. Differences between different disposal options can be substantial, given the large volumes involved. In addition, licensees may request restricted release scenarios for sites because of the cost burden for offsite disposal or processing.

The staff intends to use this framework for decision-making, as described below, and will discuss these criteria in papers sent to the Commission on specific sites.

2. FRAMEWORK FOR DECISION-MAKING

Decision-making for sites contaminated with large volumes of low-activity waste is complex and involves a number of different factors--interpretations of law, assessment of risks to demonstrate compliance with applicable laws and regulations, large costs, and significant interest from affected parties. These stakeholders include licensees who are responsible for remediating a site; members of the public who are affected by wastes left on site or disposed of at another site; and disposal facility operators who are competing for business, among others. These decisions often involve policy matters and consideration of all the factors, together. The following criteria are intended to help identify all the important issues that need to be considered in the decisions to classify long-lived, low-activity waste that is present at many SDMP sites. At the end of each criterion, its specific applicability to the SFC request to classify much of its waste as 11e.(2) byproduct material is discussed.

1. Consistent with law and regulations – Classification of wastes is one of the primary factors affecting the remediation of contaminated sites. Whether a waste is LLW, TENORM, 11e.(2) byproduct material, or pre-UMTRCA mill tailings determines the set of regulations that apply for cleanup and disposal, and may have a significant impact on the costs of remediation, even though these wastes are often similar in their radiological hazards. Classification of wastes as 11e.(2) byproduct material or some other waste category must be consistent with existing law and regulations.[3] Legislative and regulatory language is often developed to broadly address issues, but at the same time, allows some flexibility in implementation and interpretation. When a material clearly falls completely within the constraints of a particular legislative or regulatory definition, absent any compelling reasons, the staff does not intend to expend any effort to remove or modify that

[3] Licensees, of course, may request, and NRC may grant, exemptions to regulations under certain conditions. However this section, does not address exemptions.

determination. However, when a statute or regulation allows broad interpretations, thus allowing a material to meet more than one definition of radioactive material or waste, for example, the staff will consider the consequences of each classification. As an example, uranium mill tailings licensed after 1978 that contain greater than 0.05% source material could be considered to be either 11e.(2) byproduct material or licensable source material (and therefore LLW). In such a case, other available information will be examined in light of the factors identified here, to decide the best disposition of the material.

SFC Considerations: SFC's proposal to classify some front-end material from the conversion facility as 11e.(2) byproduct material is an example of the kind of approach that can be taken to classify waste (and therefore define a decommissioning approach) in a manner that is safe, meets applicable laws, and enables consideration of other important factors in remediation. Attachment 5 discusses in detail the staff's justification for classification of front-end SFC wastes as 11e.(2) byproduct material. OGC has concluded that such a position is consistent with laws and regulations, for the reasons described in the analysis.

2. Maintain safety, protection of the environment, and the common defense and security – This factor, like the first, must be met when deciding the proper disposition of a material. This factor embraces NRC's regulatory mission over the civilian uses of radioactive materials such that the proposed disposition must assure protection of public health and safety, the environment, and the common defense. Ultimately, the classification and disposition of a material must assure that this factor is adequately achieved.

There are opportunities for more risk-informed management of low-activity materials containing uranium and/or thorium. Presently, for example, the classification of a material as 11e.(2) byproduct material or licensable source material often allows for only one disposal method for each, even though the physical, chemical, and radiological characteristics, and the resulting risk, may be similar. In some cases, 11e.(2) byproduct material, source material, TENORM, and other types of LLW could be safely disposed of in either mill tailings impoundments, LLW disposal facilities, or RCRA Subtitle C, or even Subtitle D, facilities (for very low concentrations). These facilities use different methods for managing risk that have been developed consistent with the laws and regulations for each program. Although the legal definitions may preclude disposal in alternative facilities, risk considerations may not. Thus, at the request of a licensee, where flexibility is appropriate and legally allowed for classifying materials, the staff will use that flexibility to determine whether other types of disposal facilities may be protective.

SFC Considerations: Wastes consisting of yellowcake and materials contaminated with yellowcake have, since the passage of UMTRCA, been considered to be 11e.(2) byproduct material at uranium mills and are disposed of in tailings impoundments at mills [by definition, all wastes generated at a uranium mill are 11e.(2) byproduct material]. Thus, the disposal of front-end wastes from SFC in a tailings impoundment would be consistent with current practice, although the amounts and percentages of yellowcake vs. other, more conventional mill tailings, would differ.

There are also some differences in the radiological constituents between SFC wastes that are proposed to be 11e.(2) byproduct material, and the average tailings in an impoundment. These tailings usually contain small amounts of uranium on average (38-380 pCi/g) and larger amounts of radium (340-1000 pCi/g of Ra-226) and thorium-230 (340-1000 pCi/g). The SFC proposed 11e.(2) byproduct material on average contains approximately 300 pCi/g of uranium, 10 pCi/g of Ra-226, and 580 pCi/gram of Th-230. The raffinate sludge at SFC contains an average of 8990 pCi/g of uranium, and 23,030 pCi/g of Th-230,[4] but when mixed with the lower concentration soils and other 11e.(2) byproduct material at SFC, produces a tailings impoundment with average concentrations of uranium and thorium in the range of conventional mill tailings. The radium content is considerably less at SFC than conventional mill tailings, and thus the radon hazard is less. It should be noted that the above values for conventional mill tailings are average concentrations, and the concentrations of waste vary with the stage of the milling process. Uranium mills also dispose of yellowcake as 11e.(2) byproduct material, and its concentrations of uranium and thorium are similar to those of yellowcake and other higher activity wastes at SFC.

From a risk management standpoint, whether yellowcake or front-end wastes are disposed in a tailings impoundment, which mainly relies on the RCRA design provisions for hazardous waste facilities, or under the restricted release provisions of the LTR, is not significant. Both are protective of public health and safety. The 10 CFR Part 40, Appendix A, provisions, which are based on RCRA, rely on engineered barriers and long-term controls to ensure isolation of the waste. The LTR provisions rely on reducing the residual radioactivity at the site to levels that would not result in radiation exposures over 25 mrem/yr and as low as is reasonably achievable with restrictions in place, and 100 mrem/yr or 500 mrem/yr, if restrictions fail. Although these regulations are different, both can be protective for the SFC wastes. The back-end wastes from the SFC conversion processes, which will likely be proposed for disposal in the tailings impoundment, are also expected to be safely isolated, given the requirements of 10 CFR Part 40, Appendix A.

3. Make NRC activities and decisions more effective, efficient, and realistic – There are several considerations affecting this factor that may arise for a site undergoing cleanup. They include the following:

- Staff use of established procedures and practices (such as 10 CFR Part 40, Appendix A) for onsite stabilization, in lieu of developing new or unique ones.

- Staff use of the restricted release provisions of the LTR in 10 CFR Part 20, Subpart E, which are relatively new and haven't yet resulted in a completed termination and require experience in the establishment of procedures and practices.

[4] January 5, 2001, letter from John Ellis, Sequoyah Fuels Corporation, to Larry Camper, NRC, Table 2. Average concentrations of total 11e.(2) byproduct material at SFC derived from values in tables.

SFC Considerations: The staff believes that a prompt, well-documented, and reasoned decision on the licensee's proposal to classify some wastes as 11e.(2) byproduct material will lead to the most effective and efficient use of resources by all parties. Assuming that the classification issue is resolved, finding a third party/long-term custodian for the site under the LTR is expected to be problematic. DOE is proposing to transfer its stewardship responsibilities to another Federal agency, and is therefore unwilling to proceed with a memorandum of understanding that would define the conditions under which it would assume responsibility for NRC sites under Section 151(b) of the NWPA. Determining whether DOE's successor for stewardship would be willing to take the SFC site is unclear and will take staff time to resolve. SFC has been unable, to date, to find an organization willing to accept the independent third party/custodian responsibilities needed to have a restricted release under the LTR. Thus, Option 1 may not be viable, and it would not be efficient for NRC staff to continue its review of the current SFC LTR decommissioning plan and develop a final Environmental Impact Statement (EIS) given this uncertainty. This is consistent with the staff's existing phased approach to reviewing future restricted use proposals which necessitates resolution of the institutional control issue before other technical reviews and the EIS are started. Staff and licensee resources will thus be used more efficiently.

Decommissioning under 10 CFR Part 40, Appendix A, in Option 2 would provide more certainty for success and is expected to be more efficient. Staff requested DOE's opinion on SFC's proposal. DOE responded, in a May 2001 letter (Attachment 8), stating that it does not have any formal position on the issue, leaving classification of the material up to NRC. DOE acknowledged its statutory responsibilities under section 83 of the Atomic Energy Act (AEA), as amended by UMTRCA, and requested prior notice, for budget purposes, if NRC decides that the materials from the front-end process are to be defined as 11e.(2) byproduct material. DOE did not address whether it would accept non-11e.(2) byproduct material in the disposal cell. Before the staff could approve a licensing action for 11e.(2) byproduct material, SFC would need to resolve its approach for the non-11e.(2) byproduct material.

4. Reduce unnecessary regulatory burden on stakeholders – The licensee is primarily responsible for determining the safety of an operation and the disposition of its licensed material. This is considered and integrated into the prevailing laws and regulations, and is a necessary burden that the licensee must bear. NRC assures the licensee's actions are, at a minimum, adequate to address safety. As the regulator, NRC might impose additional burdens on the licensee, either intended or unintended, which may or may not enhance the adequacy of safety. The staff should be aware of those burdens when evaluating proposed alternatives and interpreting legal and regulatory requirements. The staff should take those burdens into account and discriminate between those that are necessary and those which are not. The staff, for example, is generally aware of a range of disposal costs for different types of facilities and is able to approximate the cost of disposal in consideration of potential economic burdens.

Because licensees are best equipped to determine what the burdens may be, their specific proposals to NRC for disposal or decommissioning will consider this factor. The staff will also consider what the burdens might be and, more importantly, not rule out approaches

that are safe and meet applicable laws and regulations. This is particularly important for sites such as those where the cost differences between different regulatory approaches can be so significant.

For any new interpretations or changes from previous staff positions, the staff will also consider what potential "unintended consequences" might result, so that potential impacts on previous decisions or future decisions are anticipated and factored into the decision-making process.

SFC Considerations: SFC thus far has been unable to identify an independent third party/custodian willing to accept the responsibilities needed to have a restricted release under the LTR. If SFC were unable to implement its proposed option for classifying front-end material as 11e.(2) byproduct material, then, as a practical matter, offsite disposal of all of the wastes would be required, and would cost substantially more than an onsite remedy.[5] This assumes that SFC would continue to be unable to identify an independent third party/custodian for the site, to use restricted release provisions of the LTR. The completion of an Memorandum of Understanding with DOE, that would have allowed for the transfer of sites to DOE as the long-term custodian under section 151(b) of the (NWPA), is highly uncertain. DOE is exploring transferring its stewardship responsibilities to another agency, and the staff believes that it will be difficult for SFC to obtain a commitment from DOE or its successor, if the responsibilities are transferred. In any event, a DOE transfer to another agency could take more time and thus delay SFC decommissioning, and use more of the limited SFC funds for decommissioning. Classification of the front-end wastes as 11e.(2) byproduct material might also provide other alternatives for SFC to remediate the site, in addition to installing a 10 CFR Part 40, Appendix A, disposal cell, such as direct disposal of the material in an existing tailings impoundment. SFC is in the best position to determine how to minimize unnecessary regulatory burdens.

With respect to "unintended consequences" from an NRC decision to classify front-end wastes at SFC as 11e.(2) byproduct material, the staff believes that the flexibility offered in this case in interpreting UMTRCA is limited to the milling process (i.e., activities involved with the extraction or concentration of uranium) and cannot foresee any adverse consequences in this limited decision. The only other commercial conversion facility in the U.S., the Honeywell plant at Metropolis, IL, currently does not perform milling operations.[6] The three other sites in the SDMP that are considering restricted release are clearly different from SFC and could not be considered for an 11e.(2) byproduct material classification of their wastes. Once the fuel cycle is beyond natural uranium oxide, and the conversion processes is initiated, the milling process is clearly completed.

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[5] SFC has not provided a cost estimate for an 11e.(2) cell. The staff estimates, based on the cost for a cell meeting the 10 CFR Part 40, Appendix A, requirements, that SFC would save several tens of millions of dollars with an onsite remedy.

[6] Although uranium milling was not performed at Honeywell in the recent past, the staff is determining whether uranium milling was ever performed at this facility. If so, some wastes could be potentially be classified as 11e.(2) byproduct material. Honeywell has not indicated that it would pursue this classification with NRC.

5. Increase public confidence – Each site has specific public confidence issues that need to be considered. Holistically, the staff expects that the public's confidence in NRC's regulatory activities will increase if all the other previous factors are adequately addressed and communicated to all stakeholders. However, site-specific public issues and concerns may overtake the importance of some of the other factors in the decision-making.

SFC Considerations: The staff will gain a thorough understanding of the public's views on these alternatives when it prepares the EIS and publishes it for public comment. In the meantime, the staff is aware of several of the views of stakeholders. The State of Oklahoma is opposed to becoming the third party for enforcing institutional controls for a license terminated under the restricted release provisions of the LTR. The staff believes that the State is more open to a site that would be under the control of DOE as the permanent landowner under UMTRCA, than continued delays in remediating the site. In its recent undated letter (sent on April 11, 2002), the Cherokee Indian Nation stated that while it prefers offsite disposal, if onsite disposal is necessary, it prefers that DOE be the long-term custodian. The Cherokee Indian Nation also indicated that if onsite disposal is necessary, it would be interested in being a contractor to DOE to carry out long-term care and monitoring activities, but is not prepared to be the third party under the LTR. A few members of the local public appear to be opposed to any onsite disposal remedy.

In theory, any decision which might facilitate decommissioning and minimize delays would increase the likelihood of SFC's successful remediation of the site and termination of its license. Thus, public confidence could be increased by Option 2 that offers the prospect for a long-term custodian and a path to completion.